Clinical Protocols

on

Anaesthesiology

by

Dr. B.S. Sudha
MD, D.A
Prof. & Head Of Department
of Bangalore Medical College

Karnataka Health Systems Development Project
Government Of Karnataka

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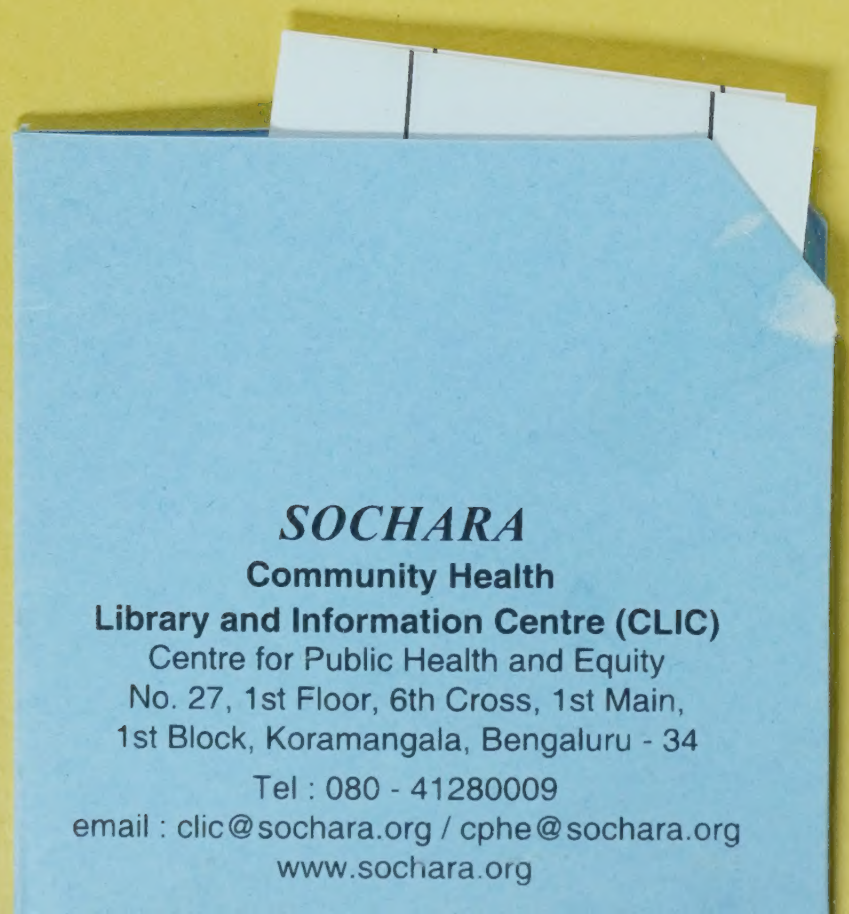

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Preface

The clinical protocols are emerging as indispensable diagnostic tools. They aid the doctor in diagnosing the problems. They are readily available technical keys and help the clinicians to treat the cases on modern lines. Such tools render qualitative services to the patients. The Karnataka Health Systems Development Project recognised the need to bring out clinical protocols as an aid to the doctors working at Community health Centre, Taluka Level General Hospitals and District Hospitals. Although many doctors are specialists they are not sufficiently exposed to modern techniques and diagnostic methods. Refresher courses, CME programs, conferences, seminars help in upgrading their clinical skills and hence KHSDP embarked on a massive training programme to upgrade the technical skills of doctors working in secondary hospitals. In addition it was decided to bring out clinical protocols on all specialties to enable the doctors to diagnose the problems quickly and properly.

Anaesthesiology is a very important faculty, as it deals with life and death emergencies at all times. This specialty requires a good knowledge in depth regarding all systems of human being from CNS to periphery for immediate reaction and correction of imbalances. Hence a dedicated team of doctors were requested to do a thorough job to figure out every small detail for the benefit of Anaesthetists working at various categories of hospitals.

Dr. B.S. Sudha, MD, D.A., Prof. And HOD of Anaesthesiology, Bangalore Medical College was entrusted with the task, as she has a wide clinical experience in managing all kinds of complicated cores in a wide variety of specialties - General surgery, Orthopedics, Urology, Obstetrics and Gynaecology, ENT, Ophthalmology etc., as she heads the operation theaters of >1000 bedded Victoria and Vanivilas Teaching Hospitals., She has been a constant guide to all Post Graduates for their thesis and has trained many youngsters under her stewardship, who are now working independently in India and abroad. She was assisted ably by a team of doctors - Dr. R.S. Raghavendra Rao, Dr. Illyas, Dr. Kishore Reddy, Dr. Narasimha Prasad, Dr. M. Raghunath, Dr. Ravish Jeeji & Dr. V.S. Vinaya Kumar to whom, I offer my sincere thanks for their valuable time and expertise and cooperation in preparing the protocols.

I sincerely thank Dr. Subramanya, IAS, Project Administrator, Karnataka Health Systems Development Project, Bangalore without whose help and guidance the task was an impossibility.

I also thank all other Doctors / Paramedical staff of hospitals and staff of the KHSDP office who have played their vital roles during the preparation of this clinical protocols.

Dr. Vijayalakshmi,
Addl. Director, KHSDP.

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CARE OF AIRWAY EQUIPMENT

Aims :

- Understanding how and when to use airway equipment, since many of preoperative, postoperative, medical and surgical complications can be prevented by a good airway management.

Learning objectives :

1. Participant should know what are the essential airway equipment
2. Should know to identify the equipment
3. Should know how to arrange the equipment
4. Should know how and when to use them
5. Should know how to sterilise them
6. Should know how to increase the shelf life of equipment.

Teaching or learning methods :

1. Basic knowledge assessment
2. Teaching by lectures and audiovisual aids
3. Self study of manuals
4. Demonstration of equipment
5. Teaching the usage of equipment
6. Demonstration and practice the after care of equipment

Evaluation :

- Evaluation by check list

Title Definition:

- Selecting identifying and care of appropriate airway equipment as use of equipment is essential in various anaesthesia procedures, medical and surgical conditions.

Airway Equipment :

1. Self inflating resuscitation bag
2. Face mask
3. Airways
    a) Nasopharyngeal
    b) Oropharyngeal
        - Metallic
        - Rubber / Plastic
4. Mouth gag
5. Laryngoscope and blades
6. Endotracheal tubes
7. Stilet

8. Forceps
    a) Macpills
    b) Artery
9. Connectors
    a) Metal
    b) Plastic
10. Syringe
11. Adhesive plaster
12. Suction apparatus
13. Circuits
    a) Adult
    b) Pediatric

Care of airway equipment :

Sterilization techniques

Definitions :

1. Cleaning : Removal of all foreign materials from objects. E.g., Washing with soap and warm water.
2. Antiseptic : Any substance which has antimicrobial activity and that can be safely applied on living tissues. E.g., Suspical spirit.
3. Disinfection : The destruction of many but not all micro organisms on inanimate objects. E.g., Gluteraldehyde
4. Pasteurization : The equipment is immersed in water at an elevated temperature (less than 100^0C) for a given time period.. Time and temperature recommended vary E.g.,m 77^0C for 33 min.
5. Sterilization : Destruction of all viable forms of micro organisms including spores. E.g., Autoclaving

Methods of sterilization and after care :

1. Self inflating resuscitation bag - Washing with soap and luke warm water.
2. Face mask - Cleaning and pasteurization.
3. Airways - Cleaning and
    - Metal - Autoclaving
    - Plastic - Pasteurization.
4. Mouth gag - Cleaning and Autoclaving
5. Laryngoscope with blades - Cleaning and antiseptic wash.
6. Endotracheal tubes - Cleaning with brush and pasteurization.
7. Stylet and Forceps - Cleaning
8. Connectors -
    - Metal - Cleaning and pasteurization
    - Plastic - Cleaning
9. Circuits - Cleaning and pasteurization

Check of Equipment Functioning

1. Self inflating resuscitation bag :

    a) Inspected for signs of tears and cracks
    b) Patient port is occluded and the bag squeeze, pressure should build up rapidly to a point at which the bag can no ionger be compressed.
2. Face mask : inspect for foreign bodies air leak and correct fit.
3. Airways : Inspect for foreign bodies and check the patency
4. Laryngoscope and blades : Check whether the blade fits well to the scope, light source and batteries.
5. Endotracheal tubes : Check for patency and cuff for leak.
6. Connectors : Inspect for foreign bodies and patency.
7. Suction apparatus : Check its functioning

Indications for use of airway equipment :

1. Self inflating resuscitation bag and face mask
    a) During CPR
    b) Apneaic episodes due to drugs
    c) Management of respiratory depression.
2. Airways : To prevent airway obstruction due to tongue fall as occurs in comatose or drug over dosage patients.
3. Laryngoscope with blades for endotracheal intubation.
4. Mouth gag : To prevent biting of ETT which can cause airway obstruction
5. Suction apparatus : To suck Oropharyngeal secretions and prevent aspiration into airway.

CHECK LIST

Activity	Performance		
	Satisfactory	Unsatisfactory	Not Performed
1. Identification of equipment and its arrangement 2. Process of Sterilization 3. Ability to use 4. After care of equipment 5. Indication for use.			

30 DAY TRAINING PROGRAMME

Day 1 :

- Registration
- Pretest

I Week :

- Demonstration of the equipment
- Demonstration of the use of airway equipment
- Lecture and discussion on use of airway equipment

II Week :

- Practice of use of airway equipment
- Lecture and discussion on after case of airway equipment
- Supervised practice of use of airway equipment

III Week :

- Independent use of airway equipment
- Independent after are of airway equipment

IV Week :

- Discussion
- Clarification of doubts

Last Day :

- Post test and evaluation
- Awarding of certificates

RECENT ADVANCES IN TECHNIQUES AND USE OF LATEST DRUGS

I ***AIM :*** As anaesthesia and technology advance, more sophisticated equipment, drugs and techniques are being used. It is essential to have adequate information of the same. This session is aimed at enlightening the use of recent drugs, techniques and equipment over the existing ones and also to lessen the pre-operative complications.

II. ***Learning objectives :***

1. To know the advantages of newer drugs
2. To improve the surgical requirements
3. To minimize the blood loss
4. Use of newer equipment as on aid in difficult cases.
5. Use of new monitoring techniques to decrease preoperative complications.
6. To provide post operative pain relief.

III. ***Teaching or learning methods :***

1. Pre-test
2. Providing literature about the drugs techniques and equipment.
3. Audio - visual and practical demonstration
4. Post test.

IV. ***Evaluation :***

1. Pre-test
2. Supervision of the usage of newer drugs, techniques and equipment.
3. Post - test.

Newer Drugs :

Some salient points about the newer drugs under various groups are given below :

1. Pre - medicant drugs

a) Midazolam :

- It is a water soluble benzodiazepine
- It is less veno irritant
- It is shorter and faster acting
- It can be used for pre medication, sedation and also for induction.
- It is an anxiolytic, amnestic, Anti-convulsant and skeletal muscle relaxant.

b) Glycopyrrollate :

- It is a quarternary ammonium compound, Synthetic, longer acting anticholinergic

- It does not cross blood brain barrier.
- It is a good antisialogogne and a potent - vagolytic drug.
- It is more ideal than atropine in antagonizing Neuro muscles blockade with Neostiguine.

2. Intravenous induction agents :

a) Ketamine hydrochloride

- It is a phencyclidine group of drug.
- It can be used by intravenous, intramuscular, oral, intranasal and epichiral routes.
- It is a potent analgesic with symptomatic activities.
- It is used in short surgical procedures and in few high risk patients.
- It should not be used in hypertensive patients, patients with IHD, diabetes mellitus and in those with increased intracranial tension.

b) Etomidate

- It is a new induction agent with least cardiovascular side effects.
- It is useful in compromised cardiac patients, pregnancy induced hypertension and eclamptics.
- It does not cause involuntary movements.

c) Propofol

- It is a phenol derivative
- Induction and recovery are more rapid and complete.
- It has minimal residual CNS effects.
- It has a major role in day care surgery and in total intravenous anaesthesia (TIVA)

3. Inhalataional induction agents :

a) Halothane

- It is a haligenated hydrocarbon
- It has sweet non pungent odour
- It has rapid onset and rapid recovery
- It is more useful in pediatric anaesthesia
- It sensitizes myocardium for circulating catecolamine.

b) Enflurane

- It has pungent ethereal odour
- Induction and recovery are rapid
- It not arrhythmogenic
- It is resistant to metabolism, unlike halothane.

- It is epileptogenic, hence contraindicated in epileptics.

c) Iso flurane

- It is an isomer of enflurane
- It is the least metabolized in the body
- it has pungent ethereal odour
- It is more cardiovascular stable.
- It is extremely stable with long staff life without any preservative.

Sevoflurine and desflurine are the more recent newer inhalational induction agents.

4. Newer analgesics

a) Fentanyl

- It is a phenyl piperidine derivative 75 to 125 times more potent than morphine.
- It is more cardiovascularly stable.
- It is a shorter acting drug.
- It does not cause much histamine release.
- It is used in intravenous, oral, trans-mucosal and epidermal routes.

Sufentanil and Alfentanil are the newer opined analgesics with more potency and shorter duration of action.

b) Tramadol hydrochloride

It is a synthetic drug acting on opioid receptors.
It does not have any opiod side effects.
It does not cause respiratory depression.
It can be used oral, intravenous and epidural routes.
It is also useful for post - operative pain.

c) NSAID : Diclofenac sodium, Ketoralac.

They are non-narcotic, nonsteroidal analgesics.
Potent analgesics with good anti inflammatory property.
It is useful in moderate to severe painful conditions.
It does not have any sedative and amnestic activity.

5. Newer Muscle - relaxants :

a) Short acting : Miracurium

It is a non-cumulative, non depolarizing muscle relaxant.
It has no vagolytic or ganglion blocking effect.
It does not cause any histamine release.

It is broken down by plasma cholinesterase.
It is helpful in rapid sequence induction next to succinyl chorine.

b) Intermediate acting : Atracurium and Vecuronium

Atracurium

It is a non - depolarizing muscle relaxant.
It is non - vagolyte, non - ganglion blocking drug.
It does not depend on kidney or liver for elimination.
It is safe in hepatic and renal disease in patients.
The histamine release from this is less significant.

Vecuronium

It is a potent non - depolarizing muscle relaxant
It is non - cumulative , non vagolytic drug
It has good cardiovascular stability
It is metabolized mainly in liver.
It does not cause histamine release

c) Longer acting drugs : Pipecuronium and Doxacurium

They are non - depolarizing muscle relaxants
The histamine released is insignificant
They have a duration lasting upto 120 minutes
They are easily antagonized by anticolinesterases.

6. Newer Anti-emetic : Ondanestrom

It is a potent selective anti-emetic drug
It acts centrally as well as peripherally
It is very useful as an anti-emetic during pre-operative period.
It does not have cardiovascular side effects, extrapyramidal side effects or undue sedation.
Only side effect of the drug are constipation and mild headache.

NEWER TECHNIQUES

1. *Total intravenous Anaesthesia (TIVA)*

   - It is maintenance of anaesthesia by intravenous agents only.
   - TIVA reduces atmospheric pollution and more useful in techniques outside operating room.
   - It is very useful in short surgical procedures and day-care surgeries and endoscopies.
   - Agents used are ketamine , propofol, etomidate and midazolam with short acting opioids.

2. *Continuous nerve blocks.*

   - Using small bore catheters continuous analgesia is achieved in epidural, subarachnoid and some major peripheral nerve blocks.
   - It is useful technique for labour analgesia, long duration surgical procedures and in post - operative pain relief.
   - This decreases systemic side effects.
   - The drugs used are Bupiracaine and lignocaine and short acting opiods.

3. *To minimize blood loss.*

   - Apart from using toniquets, positioning and local vaso constrictors the present technique is the preferred one.
   - This technique called "Induced hypotension" so as to minimize the blood loss and also provide more clear operative field.
   - Sodium nitroprusside nitroglycerin and adrenergic blockers are some of the drugs used.
   - Intentional haemodilution, predonated blood for auto transfusion are some of the other methods.

4. *Miscellaneous :*

   - Newer surgical techniques like endoscopic surgeries, day care surgeries and extra corporeal.
   - Shockwave lithotripsy require shorter, lighter anesthetic techniques.
   - TIVA, use of short acting relaxants and regional blocks are some of the techniques suited for these procedures.

NEWER EQUIPMENT

1. Laryngeal mask Airway (LMA)

    - It is a transparent tube with wide internal diameter with an elliptical cuff fitting the laryngeal inlet.
    - It can be used as an alternative to face mask or endotracheal tube in both spout aneous and controlled ventilation.
    - It is very useful in difficult airway patients.

2. Oesophageal obturator airway (EOA)

3. Oesophageal tracheal combitude (ETC)

    - These are designed for blind introduction into oesophagus.
    - By occluding oesophagus they prevent aspiration and provide access for airway management.
    - They are more useful for resuscitation measures even by inexperienced personnel.

4. Fibro-optic laryngoscope :

    - This has revolutionized the difficult airway management in anaesthesia and intensive care.
    - It can be used for both oral and nasal routes.
    - It can be easily maneuvered in patients with deformed or traumatized anatomical features.

5. Infusion pumps :

    - They are calibrated intravenous infusion aids.
    - There are drug selective, rate selective controls available.
    - Computer aided infusion pumps are also coming into use.

6. Pulse Oximetry

    - This is a non - invasive transcutanious measurements of pulse rate and oxygen saturation of the haemoglobin.
    - This equipment gives a continuous display of both the parameters in graphical or and digital values.
    - It is a very useful monitor in pre-operative period with less inaccuracies.

7. ECG Monitor

    - This shows electrical activity of the heart.
    - Arrhythmia's, Ischemias are rapidly identified to be corrected.

- As an adjacent to this equipment non-invasive blood pressure monitor, defibrillator and peripheral cutaneous pacers are available.

8.Capnography

- It shows a graphs and digital display of concentration of carbondioxide in respiratory gases.
- It is useful in identifying proper placement of endotracheal tube.
- It is useful in assessing quality of ventilation.

9. Peripheral Nerve Stimulator.

- It is a equipment used to monitor neuromuscular transmission.
- It is helpful in high risk cases to supplement the muscle relaxant.
- It is useful in judging the recovery status of the patient.

10. Arterial blood gas analyser

- By drawing heparinized arterial blood we can assess various parameters like p^H, PCO_2, $PaCO_2$, SaO_2, Bicarbonate levels, Base excess, serum electrolytes, haemoglobin, haemotocrit, etc.,
- By rapid analysing of the above parameters. It is easy to identify the pathology early and treat accordingly.

One week training programme on recent advances in techniques and use of latest :

Drugs :

Day 1	• Registration • Pretest • Introductory lecture about the above topic.
Day 2	• Lecture and discussion on newer drugs
Day 3 and Day 4	• Demonstration of newer techniques • Practice of newer techniques
Day 5 and Day 6	• Lecture and discussion • Demonstration of newer equipment • Practice of usage of newer equipment under supervision
Day 7	• Lecture and discussion • Post test and evaluation • Clarification of doubts • Awarding of certificates

REGIONAL TECHNIQUES

I. ***Aims and Objectives :***

This session is aimed at making the medical graduate understand and appreciate the simple regional techniques their application in ananesthetising patients for regional surgeries.

II. ***Learning Objectives :***

Participant at the end of the session should

1. Have a thorough knowledge of the pre -operative assessment.
2. Be aware of indications, contraindications for regional techniques
3. Have sufficient knowledge regarding Regional Anatomy
4. Be aware of the drugs used in regional techniques, their side effects, management of the same.
5. Be aware of the regional techniques, their complications, prevention and treatment
6. Be aware of positioning for these techniques.
7. Be able to give appropriate of post - operative instructions.

III. ***Learning Methods :***

1. Pretest
2. Lecterns and Audio Video demonstration of Regional anatomy.
3. Demonstration of procedure on patients in OT.
4. Supervised training
5. Post test.

V. Evaluation :

1. Observe "in situation" performance
2. Evaluate by checklist

VI. Definition :

- *Regional Anaesthesia :*

Making a part / region of the body unaware of pain by administering analgesia / anaesthetics.

Regional Technique :

Art of administering analgesia and anaesthesia drugs using knowledge of regional anatomy for surgeries limited to regional areas, to avoid the complications of General Anaesthesia.

Regional techniques may be :

a) Topical
b) Infiltrative
c) Peripheral neural blockade
d) Spiral / /Epidural
e) Intravenous Regional Anaesthesia

Why Regional Techniques ?

VI. ***Regional Anaesth Vs General Anaesth :***

Advantages

1. Preserves airway reflexes
2. Reduced Metabolic changes following surgery
3. Post - op Analgesic
4. Allows verbal communication
5. Avoids complications of GA

Disadvantages

1. Toxicity of drugs used
2. Potential Neural damage
3. Motor weakness and urinary retention
4. Patient embarrassment e.g., Lithotomy position

Advantages

- Secured Airway
- Assured Oxygenation
- Titrable effects

Disadvantages

- Compromised protective reflexes
- Nausea, Vomiting
- Inadvertent Awareness
- Polypharmacy and adverse drug reaction

VII. Golden Rules of Anaesthesia :

1. Assess and prepare the patient adequately
2. Starve him at least for 6 hr. even if using a local anaesthesia.
3. Check drugs and equipment
4. Always anaesthesia on a tipping table.
5. Keep a sucker ready [SUCTION APPARATUS]
6. Keep his airway clear.
7. Be ready to control his ventilation.
8. Have a vein open [HAVE AN INTRAVENOUS LINE]
9. Monitor his pulse and Bp.
10. Always have someone in the room who can apply cricoid pressure effectively.

VIII. ***Indications, Contraindications for Regional Techniques :***

Indications :

a) Surgeries confined to regional areas, infraumblical, perineal surgeries.
b) Very short procedures on limbs
c) To provide post op analgesia.

Contra Indications :

Absolute :

a) Patient refusal
b) Allergy to local anaesthetic
c) Absence of resuscitation equipment
d) No IV access for resuscitation.
e) Coagulopathy
   Therapeutic
   Pathological
f) Local sepsis at the point of injection
g) Hypovolemic shock

Relative :

a) Neurological disease
b) Orthopedic disease e.g., IV dise prolapse
c) Pediatric age esp. Neonates
d) Sever cardiac disease
e) High abdominal surgery.
f) Increased intracranial pressure.

IX. ***Equipment :***

1. Gloves, Gowns, Masks
2. Resuscitation drugs
3. Anesthetic machines, O_2 source
4. Appropriate needles, syringes, catheters.
5. Trollery (Tippint)
6. Access to circulation.
7. Trained assistance (positioning)
8. O_2 and means of administering under pressure.
9. Means for assisted ventilation
10. Laryngoscopes and Endotracheal tubes
11. Suction
12. Approximate local anesthetic drugs
13. Autoclaved sets e.g., Spinal sets.

X. Conduct of Regional Techniques :

1. Regional Anatomy for Central Neural Blockade :

   a) Spinal cord extends from Brain via the foranum magnum into conus medullaris
   b) Distal end lirminates at L3 in infants and L1 (Lower end of L1 vertebra) in adults.
   c) Cord surrounded by pia, arachnoid and dura matter from within outside

d) Sub arachnoid space extends upto S2
e) Sub arachnoid block acts of nerve roots in the subarachnoid space between pia and archnoid. Epidural anaesthesia acts in the epidural space which contains loose aicolar tissue and blood vessels.
f) Line joining the highest points of that crest corresponds to L3 - L4.

2. Performing Spinal Anaesthesia :

a) Pre - anesthetic evaluation
b) Preparation
c) Position
d) Projection
e) Punetine

XI. Pre - anesthetic Evaluation :

- Thorough history taking
- General physical examination
- Special attention to airway and spine assessment.

Spinal Column :

- Look for General Spinal configuration
  Kyphosis / Lordosis
  Operative scars on back
  Symmetry of back
- Feel for Spinal processes
  Supraspinous ligaments
  - whether fibrosed
  Vertebral / paravertebral tenderness.

Order for

Hb%
TC
DC
ESR
FBS
Urine - Routine
ECG
Blood urea
Serum creation
Cx R
Spine X Ray
Other investigations if indicated by clinical examination.
RULE OUT COAGULOPATHY

Preparation :

- Check the equipment
- Check spinal needle patency
- Syringe patency
- Paint back with antiseptic

Position :

Most important aspect of Regional Techniques may be :

a. Lateral decubitus :
    - Most commonly used.

Thighs and neck flexed on the abdomen, back lies parallel to the edge of table.

b. Sitting position :

    - For low lumbar anaesthesia
    - Perineal, urological surgeries, obese patients this position preferred.
    - Neck and arms of patient flexed, patient sitting vertical.
    - Don't allow the patient to slump.

XII. ***Projection and puncture :***

1. Identify space
    - Median or para-median approach.
2. Infiltrate locally with 2% xylocaine.
    - With spinal needle perpendicular to the spinal axis, parallel to ground advance by millimeter.

Structure period :

- Skin
- Subcutaneous plane
- Supraspinous ligament
- Interspinous ligament
- Ligamentum flavum
- Dura

End Point :

- Free flow of CSF [Confirm by warmth]
- Inject drug slowly 0.2 ml/sec.
- Median approach preferred because it is relatively avasucular, identification of structures better.

Paramedian approach :

- Preferred when supraspinous and interspinous ligaments fibrosed.
- Preferred in extradural technique.
- Preferred in conditions limiting flexion of spine.

XIII. ***Drugs used for intradural analgesia :***

1. Lignocaine :
    a. 1%, 2%, 5%.
    b. Anaesthesia for 60-90 mins.
    c. Max. dose with Adrenaline 6mg / kg.
       Without Adrenaline 3mg/kg.
    d. Used for Isobaric / Hyperbolic Intradural block.
    e. Central Nervous Toxicity more common.
2. Bupivacine :
    1. Longer latent interval 15-25 mins.
    2. Anaesthesia lasts for 3 - 6 hrs.
    3. Best drug for regional blockade
    4. Used in 0.25%, 0.5%
    5. Max. dose is 2mg / KBW
    6. Cardiovascular toxicity more frequent.

Side Effects, Complications, Prevention and Treatment :

Timing	**Complication**	**Therapy**	**Prevention**
During induction	1) Vasovagal syncope	• Vagolytic dose of atropine • Vasoconstrictor	• Lp in lateral decubitus • Iv infusion • Vasoconstrictors • Atropine
After induction	1) Hypotension 2) Dyspnoea in high spinal 3) Apnoe in total spinal	• Iv fluids Vasoconstrictor • Atropine • Atropine • Antiemeter • Oxygenate	• Preload with crystalloid • Atropine • Antiemeter, Sedative premedication.
	4) Bradycardia	• O2 by Nasal prongs • Mask ventilation	• Keep level as low as possible
	5) Nausea and vomiting	• Intubation • Ventilation • Sedation	• Keep level as low as possible
Late Seuelae	1) Spinal headache	• Horizontal position • Hydration • Epidural saline [blood pateia]	• Fine needle puncture (whita care) • Single small dural puncture.
	2) urinary retention	• Catheterise after "wait and watch"	• Appropriate • IV commensurate with length of block
Late Neurological Sequelar		Does not cause permanent damage Treatment as per condition	

Brachial Plexus Block : (Trans axillary approach)

For

a) Surgeries on forearin and hard
b) Alternative to stellate ganglion block in painful conditions of arm and hand.
   E.g., Occlusive arterial disease.
   Sudeethe dystrophy

Contraindications :

Lymphangitis, Local sepsis.

Definition :

Unilateral block of brachial plexus in axilla.

Regional Anatomy :

- Plexus follows course of Axillary artery and vein
- When arm abducted to 900, Radial nerve cephaland and behind axillary artery ulnar nerve lies dorsal and caudal to axillary artery and median nerve lies on the artery.

Technique :

- Under strict asepsis, palpate axillary artery in the highest point of axilla
- Advance into the facial sheath
- Push cranially of the arterial pulsation
- Inject 10-15 ml to block radial nerve.
- Direct the needle caudally to block ulnar after aspirating, 10-15 ml LA injected.
- Inject 10-15 ml into the fascial sheath to block the median nerve.
- To block the intercislo bracluates nerve and median cutaneous nerve of area, circular field block is performed.
- Complication : Hematoma due to arterial puncture.

Intravenous Regional Anaesthesia :

- Blood from patients arm exangirinated by raising arm.
- Seal off patients arm from rest of circulation by applying a sphygmomanometer and inflate the cuff.
- Inject diluted local anesthetic into his forearm veins.
- Drug will diffuse into tissues from the capillaries to anaesthetise whole forearm.

Dangers :

- If BP cuff not reliable, drug diffuses into circulation and causes convulsions / cardiac arrest.
- Don't remove cuff for at least 20 mins. after injecting drug.
- Never leave cuff > / hr.

Check list

Performance

Activity	Satisfactory	Unsatisfactory	Non Performal
The Anesthetic Evaluation :			
• History			
• Physical examination			
• Spine examination			
• Airway evaluation			
• ASA Grading			
• Pre-op orders			
Detection of Technique:			
• Ability to secure IV access			
• Prepare and arrange table, drugs			
• Positioning for regional techniques			
• Check spiral tray, patentee of spinal needles			
• Aseptic technique			
• Identify space			
• Process of loading and injecting drugs			
• Judgement of level of anaesthesia			
• Intra - op monitoring			
• Detection treatment of complications			
• Post - op orders.			

Six months training programme on regional anaesthesia and general anaesthesia :

Day 1 :	• Registration • Pretest
I Month :	• Introductor lecture • Lecture on preamaesthetic assessment evaluation and selection of anesthetic technique. • Lecture on regional anaesthesia and general anaesthesia • Demonstration of regional and general anaesthesia.
II Month and III month :	• Practice of spinal anaesthesia and general anaesthesia • Lecture and discussion.
IV month and V month :	• Independent administration of regional and general anaesthesia. • Lecture and discussion.
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Last day :	• Post test and evaluation • Awarding the certificates

MANAGEMENT OF GENERAL ANAESTHESIA

I. ***Aims and Objectives :***

To make the medical graduate proficient in administering General Anaesthesia for patients posted for routine surgical procedures.

II. ***Learning Objectives :***

Participant at the end of the program should know

1. Assess the patients' fitness for surgery and Anaesthesia.
2. Knowledge of common drugs used in routine GA practice
3. Effect of Anaesthesia on Co-existing diseases and also the effect of Co-existing disease on conduct of Anaesthesia.
4. Pre-operative monitoring, detection and treatment of complications.
5. Evaluation of recovery status
6. Immediate Post-op care.

III. ***Teaching and Learning Methods :***

1. Pretest
2. Teaching by lectures and Audio Visual aids
3. Self study of manuals on General Anaesthesia techniques
4. Demonstration of procedure on patients in OT
5. Training under supervision
6. Post - test

IV. ***Evaluation :***

1. Observe "in situation" performance
2. Checklist

V. ***Definition :***

1. General Anaesthesia is defined as drug induced unconsciousness where patient neither perceives nor recalls noxious stimuli.
2. Does not include paralyses or analgesia when patient is awake.

A) Equipment required for GA :

- Apparatus for continuous administration of anesthetic gases and O_2 (BOYLE'S APPARATUS WITH BREATHING CIRCUITS)
- Working laryngoscopes with appropriate size blades.
- Endotracheal tubes of appropriate sizes
- Connectors (plastic/metal) to connect ETT to circuits.
- Catheter mounts

- Oral and nasopharyngeal airways
- Face masks - appropriate sizes
- Intubating forceps - MCGILLS
- Stilettos
- Suction apparatus
- Mouth gage
- Tongue forceps
- Syringes
- Laryngeal sprays
- Cylinder keys
- Monitor to monitor vital parameters

B) Golden Rules of Anaesthesia :

- Assess and prepare the patient adequately
- Starve him at least for 6 hrs. even if you are using a local anesthetic.
- Check drugs and equipment
- Always anaesthetise on a tipping table.
- Keep a sucker always ready [SUCTION APPARATUS]
- Keep airway clear
- Be ready to control his ventilation
- Have a vein open [HAVE AN INTARVENOUS LINE]
- Monitor his pulse and BP.
- Always have someone in the room who can apply cricoid pressure appropriately.

VI. ***Pre Anesthetic Assessment :***

AIM :

To take a relevant medical history perform a thorough examination and allow the patient to ask questions and allay his anxieties.

Medical History :

- Previous illnesses, surgical and anaesthet experience
- Drug therapy e.g., steroids, OC pills, etc.
- Drug allergies and addictions
- Symptoms referable to Respiratory, Cardio vascular, Central Nervous, Gastro intestinal and Genito urinary Systems.

Medical Examination :

- General physical examination
- Pallor, cyanosis, jaundice etc.,
- Assessment of vital parameters

- Assessment of Cardiovascular, Respiratory, Gastrointestinal and Genito urinary system.
- Assessment of Nutritional status
- Assessment of Airway
- Examination of peripheral veins.
- Psychological assessment.

Investigations :

- Urine - Albumin, Sugar, Microscopy
- Blood - Hb% BT
  TC CT
  DC
  ESR Grouping and cross matching
- Blood Glucose
- Blood urea, serum creation
- Electro cardiogram - mandatory for men >40, Women > 40
- CXR

Special investigations to be done when warranted by physical examination.

VII. ***Airway assessment :***

Aim :

To predict the difficulty in securing an airway (endotracheal intubation)

Look for :

ANATOMICAL ABNORMALITIES

- Congenital maxillofacial deformities
- Short neck
- Large tongue
- High arched palate
- Abnormalities of the teeth

MOUTH OPENING
MOVEMENTS OF NECK, JAW

Feel For

- Tracheal position
- Thyromental distance (Normal > 6 cms)

VIII. ***Mallampatti grading of airway : (modified) :***

Positioning :

- Neck should be in neutral position and mouth fully opened.

- Difficulty in intubation anticipated with increasing class i.e., in class III and class IV.

Class I : Soft palate, both tonsillar pillain, posterior pharyngeal wall seen.
Class II : Soft palate, ovula and fauces seen.
Class III : Only soft palate is seen.
Class IV : Soft palate not visible.

ASA Grading :

ASA GI : Normal, healthy patient

ASA GII : Patient with mild systemic disease

ASA GIII : Patient with severe systemic disease that 1 minutes their activity but not incapacitating.

ASA GIV : Patient with incapacitating illness that is a constant threat to life.

ASA G V : Moribound patient not expected to survive with or without surgery.

IX. ***Premedication :***

Aims :

1. To decrease anxiety and sedate the patient
2. To decrease secretions
3. To minimise dosages of induction agents and other anesthetic drugs
4. To provide intra operative and post op analgesia
5. To prevent per operative complications et., Nausea, Vomiting, Hemodynamie

Drugs Used :

- Atropine, Diazepam, Promethazine
- Narcotic analgesics (Fortwin, Morphine, Pethidine etc.)

Routine check list before administering GA

1. Check the laryngoscopes
2. Check ETT [Endotracheal tubes]
3. Check condition of cylinders - whether in position, full or not (including stand by cylinders)
4. In case supply from central pipeline
    a) Whether connected properly to machine
    b) Check for leaks
    c) Check the condition of stand by cylinders
5. Check flowmeters, vaporizers, (proper function leaks , cracks)
6. Check breathing circuits.

7. Check soda lime in circle absorber.
8. Check the equipment enlisted above and kept ready , are in good shape and proper fitting.

Induction of General Anaesthesia :

Types :

1. Inhalational
2. Intravenous

Agents used :

1. Inhalational : Ether, Halothane
2. Intravenous : Thiopentone Sodium, Ketamine.

Preparation before induction :

Proper premedication
Proper Iv access secured with appropriate cannula
Keep equipment and drugs ready
Record baseline parameters.

Iv Induction :

		DOSE
Drugs :	1. Thiopentone 2.5%	4 - 5 mg / KBW
	2. Ketamine	1 - 2 mg / KBW

- Inject drugs slowly, watch for patients response.
- End points noted commonly are

1. Loss of eye lash reflex
2. Loss of verbal contact

Monitor vital parameters

- Colour of skin, BP, pulse, respiration.

Inhalational :

- Halothane → 2 - 4%
- By face mask
- Increment concentration by 0.5% after 3 - 4 breaths
- Monitor vital parameters

End points :

- Loss of spontaneous movement
- Loss of verbal contact
- Loss of pharyngeal reflex
- Regular quiet breathing.

Intubation :

Transtracheal placement of ETT[ENDOTRACHEAL TUBES] to

- Prevent aspiration of gastric seg and secretions
- Reduce upper airway resistance
- Have a better control over patients respiration and oxygenation
- Keep airway clear and patent.

Procedure :

- Position - Supine, Head flexed 10 - 500 at lower cervical vertebra and extended at Atlanto Occipital job which brings laryngeal, pharyngeal and oral axis in same line, so that visualisation and placement of tube is made easy.

Technique :

- Open mouth with right thumb
- Hold scope at its junction of blade and handle with left hand.
- Introduce the blade through the right corner of the mouth.
- Take the tongue to the left side
- Advance the blade inch by inch visualisation the soft palate, epiglottis
- Once the tip of blade is in the vall lift up the blade in the direction of the handle
- Cords will come into view
- Take the ETT in the right hand concavity facing anteriorly, introduce along the right corner of mouth, place it into the trachea under vision.
- Pressure on thyroid cartilage by assistant will help in better visualisation of the cords.

Intubation is done after induction :

- After giving a short acting muscle relaxant
- Without giving a short acting muscle relaxant.

Intubation after a short acting muscle relaxation :

After reaching the end points of inducting Inj Scoline 1-2 mg/Kg given Iv
Patient has to be ventilated through a face mask till fasciculations disappear
Then intubation performed as described above.

Intubation without using short acting muscle relaxant :

- Usually done in pediatric age group and when patient is induced using inhalational agents.
- Patient should be taken to deeper places of anaesthesia before intubating
- This procedure is safer in inexperienced hands.

Confirmation of endotracheal intubation :

1. Connect the tube to circuit and ventilate

    a) Look for chest movement
    b) Auscultate for air entry (should be bilateral and equal)
    c) Absence of gurgling sound on ventilation.

2. Confirming the movement of air through the tube and movement in the reservoir bag when patient is breathing spontaneously i.e., intubation under Inhalational agent.

Maintenance of Anaesthesia :

- O_2 35%; N_2O 65%
- Supplement with Narcotic Analgesia / Inhalational Anesthetic.
- Long acting muscle relaxant Viz., Pancuroim Bromide after patient comes out of short acting relaxant (Dose : 0.08 mg/KBW)
- Controlled ventilation performed.
- When patients come out of relaxants supplementary doses ¼ - $1/8^{th}$ initial doses given Iv.

If intended to keep patient spontaneously ventilating.

- Patient ventilated till he comes out of short acting relaxant
- maintain with O_2 + N_2O + Inhalataional agent with or without Narcotic analgesics.

Intra - operative Monitoring :

- BP - preferably non-invasive technique
- Pulse - palpation of peripheral artery
- Colour of skin and mucous membrane.
- Rate and depth of respiration (when spontaneously breathing)
- Monitor cardia with precordial steth (pediatric patients)
- ECG Monitoring
- Pulse Oximetry - O2 saturation.

Reversal and Recovery :

All anesthetics cut off at the end of surgery

- Patient ventilated / allowed to breathe 100%
- Neuro muscular blockade reversed using Neostigmine 0.04 - 0.07 mg/ Kg.
  Atropine added to neostigmine to prevent muscarime action
  0.65 mg atropine to every 1.25 mg Neostigmine.

Clinical signs of adequate reversal of Neuromuscular blockade :

1. Restoration of normal breathing (rate and depth)
2. Responding to oral commands
3. Movements of all extremities
4. Sustained head left for 5 secs.

Extubation is done after throat suctioned thoroughly.

- In spontaneously ventilating patient when pharyngeal reflexes return breathing is adequate responds to pair.
- In controlled by ventilating patients after adequate reversal of neuro muscular blockade and responding to pain.

After extubation, patient is given 100% O_2 for 3-5 mins.

- Patient is shifted to post anaesthesia care unit and vital parameters monitored.

12-55

CHECK LIST

Activity	Performance		
	Satisfactory	Unsatisfactory	Not performed
Pre-anaesthesia Examination • History • Physical examination • Ordering investigations • Airway evaluation			
ASA Grading • Pre-op orders • Selection of Anesthetic techniques (drugs and dosage)			
Ability to secure Iv line • Preparing table for GA • Positioning for induction and intubation			
Induction **Intubation** • Confirming position of ETT • Fixing tube • Intra-op monitoring • Intra-op drug administration • Detection and management of complications • Judgement regarding recovery and reversal • Extubation and shifting • Post-op monitoring • Post-op orders			

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